

Subaperture Stitching Interferometry for Large Convex Aspheric Surfaces, Phase II

Completed Technology Project (2006 - 2008)



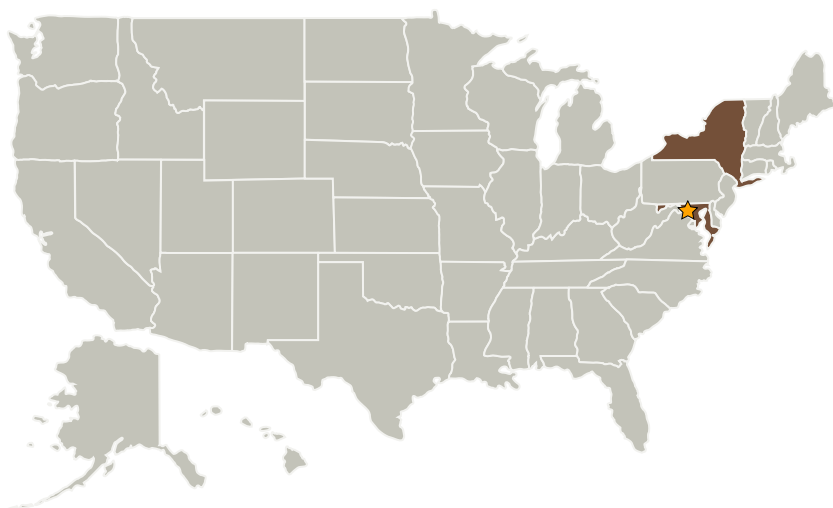
Project Introduction

The size and accuracy specifications of telescope mirrors are ever more demanding. This is particularly true for secondary mirrors, as they are convex and thus require large-aperture optics to test them. Recent NASA programs, such as the Terrestrial Planet Finder (TPF) and James Webb Space Telescope (JWST), include monolithic secondary mirrors of significant size (larger than half a meter). Secondary mirrors of such large sizes are difficult and expensive to test due to the large-aperture converging and nulling optics required. Furthermore, calibration of these optics to the level required for next-generation programs is extremely challenging. Subaperture stitching has the potential to provide accurate high-resolution maps of large-aperture aspheric optics without the use of even larger aperture optics or dedicated nulls. QED's Subaperture Stitching Interferometer (SSI

REG

) has achieved nanometer-level accuracies on spherical optics with its novel compensation techniques. Non-null capability is enhanced since the individual subapertures have significantly less aspheric departure. However, the system is currently only capable of testing up to 280 mm optics of mild asphericity. Phase I work demonstrated that the technology is scalable to larger aperture sizes. This proposal focuses on innovations for leveraging the considerable benefits of stitching (high resolution, automatic calibration, and flexible aspheric testing) to aspheric optics. Activities will include uncertainty analyses of aspheric tests, subscale measurement demonstrations, and development of concepts for testing larger amounts of aspheric departure.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission
Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center
(GSFC)

Responsible Program:

Small Business Innovation
Research/Small Business Tech
Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
QED Technologies, Inc.	Supporting Organization	Industry	Rochester, New York

Primary U.S. Work Locations

Maryland	New York
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.4 Manufacturing
 - └ TX12.4.3 Electronics and Optics Manufacturing Process